DOCUMENT RESUME

ED 311 871 IR 013 990

AUTHOR Cohen, Moshe; And Others
TITLE The World as Functional Learning Environment: An Intercultural Learning Network. Interactive Technology Laboratory Report #7.
INSTITUTION California Univ., San Diego, La Jolla. Center for Human Information Processing.
PUB DATE 85
NOTE 30p.; For related documents, see IR 013 991, IR 013 995-996, and ED 303 155.
PUB TYPE Reports - Evaluative/Feasibility (142)

EDRS PRICE MF01/PC02 Plus Postage.
DESCRIPTORS Computer Assisted Instruction; *Computer Networks; *Cooperative Learning; *Cultural Awareness; Feasibility Studies; Foreign Countries; Higher Education; High Schools; *Intercultural Communication; Junior High Schools; Participant Observation; Pilot Projects; Problem Solving; Science Instruction; Second Language Instruction; *Simulation; Social Sciences
IDENTIFIERS Contact Hypothesis; *Functional Learning Environments; *Intercultural Learning Network; Mexico; United States

ABSTRACT

Electronic networks provide new opportunities to create functional learning environments which allow students in many different locations to carry out joint educational activities. A set of participant observation studies was conducted in the context of a cross-cultural, cross-language network called the Intercultural Learning Network in order to evaluate the potential of this interactive medium for instruction. This network was established in the spring of 1984 with a series of pilot projects conducted between San Diego (California), Tijuana (Mexico), and Juneau (Alaska). Goals of the network are to: (1) facilitate interaction across cultural boundaries in joint problem solving in real and simulated instructional domains; (2) provide a motivating context for the development of literacy skills in local and foreign languages; (3) educate students about cultural diversity, ethnocentrism, and cultural relativism; and (4) promote the exploration of and exposure to local and foreign culture, norms of behavior, tradition, and values. Since 1984, the network has expanded to more sites around the world and into a broader range of activities, including joint social science studies, functional language learning activities, and distributed problem solving projects. Initial findings indicate that the Intercultural Learning Network is meeting its goals. (39 references) (Author/GL)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

This document has been reproduced as received from the person or organization originating it.

Minor changes have been made to improve reproduction quality.

Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

ED311871

Report #7

The World As Functional Learning Environment: An InterCultural Learning Network

Moshe Cohen
School of Education
Hebrew University of Jerusalem

James A. Levin
Margaret M. Riel
University of California, San Diego
La Jolla, California

1985

IR013990

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY

Randall Souviney

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

BEST COPY AVAILABLE

Abstract

Electronic networks provide new opportunities to create functional learning environments which allow students in many different locations to carry out joint educational activities. We describe a set of studies which explore the properties of electronic instructional networks. These studies have taken place in the context of a cross-cultural, cross-language network called the InterCultural Learning Network. This network was established in the spring of 1984, with a series of pilot projects conducted between San Diego, Tijuana and Juneau. Since then it has expanded to more sites around the world and into a broader range of activities, including joint social science studies, functional language learning activities, and distributed problem solving projects. We report some initial findings about how such networks can serve as distributed environments for learning.

Acknowledgements

The ideas in this paper reflect the collective work of the Intercultural Learning Network participants. We would like to acknowledge in particular the contribution of the other site coordinators: Dick Dauenhauer (Alaska, USA) Gloria Fimbres and Marcia Boruta (Tijuana, Mexico) and Naomi Miyake (Tokyo, Japan) and Bud Mehan and Randall Souviney. We would also like to thank Bud Mehan for his many useful comments on earlier versions of this paper.

The equipment for all the sites of the network was provided by a grant from the Apple Education Affairs Foundation. The software was provided by InterLearn Inc.. This research was funded in part by grants from the National Endowment for the Humanities in Alaska, Logica Corporation in Japan, The School of Education, Hebrew University in Jerusalem, and The Interactive Technology Laboratory, University of California in San Diego.

The World as Functional Learning Environment:

An InterCultural Learning Network

Electronic networks are now a well-established communication media, widely used in business and research settings. We have been exploring the potential for using these interactive media for instructional purposes, to broaden the range of resources available to students and teachers and to allow them to participate in "functional learning environments" in which students and teachers pursue goals they perceive to be important.

To investigate the potential of this medium, we established an electronic instructional network, the InterCultural Learning Network. Communication on this network takes place in "non-real time" (Quinn, Mehan, Levin & Black, 1983), though electronic messages such as this:

From: BBW928 (ISRAEL) 70-Lines
On:21 APR 1985 At: 07:38
To: (Listed below)
Subject: FROM JERUSALEM NEWS ANALYSIS

To: STK148 (SAN DIEGO AND TIJUANA)
To: BCF302 (JAPAN)
To: TCM869 (ALASKA)
To: AAD889 (OAHU)
To: BCT369 (HARTFORD)
To: BCZ397 (MAUI)

HI intercultural

Naomi and Dick, would you find some of your students to work cooperatively with us in the project described below?

Marcia and Gloria, Nos gustaria mucho que Tijuana participe en el proyecto descrito a continuacion, y por supuesto que nos pueden escribir en espanol. Nos dio mucho gusto recibir sus mensajes, sigan escribiendo!

Jim and Marcia, we have received your message, and we are glad you liked our suggestion about "The 40th anniversary of the end of the 2nd

world war". We have also read your paper "Forty Years With The Bomb". We like in general your idea, but we think it will be more interesting for our students to write about the Holocaust. So may be, we can combine the two issues. Meanwhile, we will meet the 5 high-school students next week, and we will propose them your project, and we will send you their opinion...(a detailed description of the news analysis project followed).

We are looking forward to receive your responds.

Raquel and Orit.
ISRAEL

Exchanges such as this occurred with regularity between high school and college students, teachers and researchers in various culturally and geographically diverse locations during 1984 and 1985. The vehicle for these exchanges was the Intercultural Learning Network, an electronic network connecting students in California, Mexico, Alaska, and other places around the world. The reason for making this connection goes far beyond a test of the feasibility of an electronic instructional network; there are compelling educational reasons for testing the utility of electronic networks.

The Concepts Behind the Intercultural Learning Network

A constant theme in the literature on cognition and instruction is that students learn well when they are presented tasks which are meaningful and whose purpose is easily understood by them. Piaget (1947) argued forcefully against models of learning which equate knowledge with facts, words that pass easily from the minds of adults into the minds of children. Assuming a Kantian stance, he claimed that knowledge must be recreated anew by each generation. This "construction of knowledge" takes place when students actively operate on their environment.

The educational theories of Dewey (1955, 1963) are often referred to as

"learning by doing." Although this was not his term, he was concerned with the decontextualized approach to education that has become so common place in schools. He argued that students' active involvement in the working environments of adults, in cottage industries for instance, led to more meaningful knowledge than the educational practices of classrooms divorced from the remainder of society. He sought a way to re-connect students isolated in classrooms with meaningful learning environments.

Functional Learning Environments

The Intercultural Learning Network is an attempt to instantiate these ideas about meaningful and purposeful education into a learning environment that simultaneously meets students' and teachers' educational objectives. We call learning environments which address these objectives functional. A functional learning environment is a real or simulated microworld in which students perform tasks that are meaningful to them and which also accomplish the educational goals of their teachers and society (Riel, 1985; Mehan, Moll & Riel, 1985; Newman, 1984; LCHC, 1982).

Functional learning environments are restricted and well defined contexts that focus the learner's attention, motivate the learning and performance of relevant tasks and socially reward them through the achievement of the goals. Functional learning environments can be games or simulations or real settings that are operating models of larger, more complicated or more diffuse realities.

Computers and computer networks can provide valuable resources for designing such environments (Cohen & Miyake, 1985; Levin & Riel, 1985; Levin, Riel, Rowe & Boruta, 1985; Newman, 1984; Mehan et al., 1985), opening up the confining walls of the classroom that concerned Dewey.

Peer Learning

Studies of peer learning suggest that there may be benefits to students working together that do not accrue to students working alone. Vygotsky (1978) discusses learning situations in which more knowledgeable people assist less knowledgeable people until the less capable are able to take over the task. Martin (1983) found that young children who worked together on cognitive tasks solved problems better than when they worked alone. In these settings, knowledge proceeds from the social to the psychological, as individual learners internalize the teachings from representatives of the larger society.

Studies in which students teach students (Steinberg & Cazden, 1979; Mehan & Riel, 1982; Riel, 1982) find that peers make suggestions, model and demonstrate activities to each other. Studies of "cooperative learning" situations (Webb, 1982; Slavin, 1980; Kagan, 1985), in which a classroom of students is divided into small teams whose members are interdependent, show that students improve in academic achievement, interethnic relations and pro-social development. These gains are especially prevalent among members of sociocultural minority groups.

Mehan et al. (1985) found that pairs of students working together at a microcomputer cooperated in the accomplishment of assigned writing tasks

by dividing the labor between them. While one student engaged in the task of entering text in response to general hints provided by the software, his or her partner monitored computer operations such as the use of the return or control keys and monitored writing operations such as spelling, grammar, sentence structure and the overall coherence of the composition.

Verbal interaction is a potentially important mechanism in these situations, because students working together talk outloud to each other (Hawkins, Sheingold, Gearhart & Berger, 1982). The act of verbalizing material leads to cognitive restructuring on the part of the students who are attempting to explain (Miyake, in press). Verbal interaction is also important because it leads students to hear different points of view, which, in turn, can lead to cognitive conflicts. Cognitive conflicts are important because they force learners to examine their own understanding, and to seek resolutions of conflicting viewpoints (Piaget, 1948).

Intercultural Learning

Research on cultures in contact and general intergroup attitudes in multicultural societies has tested the so called "contact hypothesis" (Brewer & Kramer, 1985). The assumption is that the shift from abstract and unfamiliar mental representations of another group to interpersonal behavior and familiarization will engender more positive intergroup attitudes and mutual social acceptance. In this line of research members of the differentiated groups are brought in contact for relatively long periods of time usually under the auspices of an educational institution.

This research has produced mixed results. Some studies have found that increases in interethnic contact related positively to changes in racial attitudes (Stephan & Rosenfield, 1978; Scott & McPartland, 1982). Other studies, however, have found less effect of contact per se on general attitudes (Amir, Bizman, Ben-Ari & Rivner, 1980; Barnea & Amir, 1981). Some studies have even reported effects of "resegregation," reduction in interracial friendship choices, in successive years following desegregation (Gerard & Miller, 1975; Davey & Mullin, 1982; Miller, Rogers & Hennigan, 1983; Jules-Rosette & Mehan, 1985).

A more mediated approach calls for the creation of joint activities requiring intergroup cooperation in order to achieve some desired goal. In this approach an environment is specificly designed to require mutual interdependence between the groups so that intergroup cooperation will be instrumental to the attainment of the goal. Supporting research for this approach focuses on cooperative learning techniques (Sharan, 1980). Meta-analyses of studies comparing this techniques, (where students are placed in ethnically mixed work groups in which their outcomes are positively interdependent) with more traditional competitive or individualistic learning environments document a generally positive effect on intergroup acceptance (Johnson, Johnson & Maruyama, 1984).

The Intercultural Learning Network takes advantage of computer technology to create functional learning environments which facilitate cooperative, intercultural learning. It opens up the opportunity to use the world as an instructional laboratory for natural and social sciences: ecological and weather systems, astronomical and geographical phenomena, dietary and public health practices -- all these topics become tangible

subjects of study when surveyed and reported by students in different locations (Levin & Cohen, 1985). Social science, contemporary history and human geography issues are also obvious subject areas to be enriched by electronically mediated inquiry projects.

The Early Development of the Network

During the Spring of 1984 we conducted a series of initial trials of the Intercultural Learning Network to test the technical feasibility of the network and the utility of cross-cultural exchanges for educational purposes. The trials were carried out in Tijuana, Mexico, San Diego, California and Juneau, Alaska. Students from junior and high school participated in various preliminary activities including an international students' news network, translation of texts at the receiving end, science and social science survey projects and crosscultural simulation games.

The goals of this pilot project and the more fully developed Intercultural Learning Network are to:

1) Facilitate interaction across cultural boundaries in joint problem solving in real and simulated instructional domains,

2) Provide a motivating context for the development of literacy skills in local and foreign languages,

3) Educate students about cultural diversity, ethnocentrism and

cultural relativism,

4) Promote the exploration of and exposure to local and foreign culture, norms of behavior, traditions and values.

Methodology

The methodology we have been using is a form of "participant observation" with an emphasis on participation. As used in anthropology and sociology, participant observation is a technique in which a researcher enters some real-world setting, acts as much like a participant as possible, and then observes the properties of the setting (Spradley & McCurdy, 1972). Since non-real time instructional networks are so new, we extended this methodology, first by establishing a setting and then by conducting systematic observations of that setting, as participants and as researchers. In taking an active role, we can explore the properties of this new setting by introducing new activities, and tracking which ones function well and which function poorly. By comparing the different activities, we can start to trace the strengths and weaknesses of this new instructional setting. And by observing human interaction in this medium and comparing it to behavior in other, more conventional media, we have a new source of data about how people work, together and individually.

The Projects

International Students' News Network. The Computer Chronicles Newswire is a network that connects elementary and secondary students in different locations (Riel, 1985). Students from classrooms in each location write and edit articles using microcomputers. The stories are transmitted to the other sites participating in the network. Students at each site edit and revise, on the computer, articles they have written as well as those written by other students in the network to produce their local edition of The Computer Chronicles Newspaper.

In our test of the Intercultural Network, secondary students wrote newspaper articles in their own language and sent them via electronic means to other sites. The articles were translated by bilingual students or used as real life exercises in foreign language classes. Working with secondary school students in this pilot project, we were able to address topics of special interest to the participants. For example, in the Tijuana-Juneau-San Diego pilot study, students were asked to write articles about topics such as: Undocumented workers in the US from Mexico, birth control, drug use by adolescents, social problems and important news events.

One of the organizing principles of the InterCultural Learning Network has been that each cultural group be actively involved in the construction of the activities. In this activity, the principal and teachers of each of the schools reviewed the topics before they were presented to the students. The principal of the school in Mexico felt that two of the topics were presented in a way that implied an American point

of view on the issues. He changed the wording of "Undocumented workers in the US from Mexico" to "Problems related to the floating population in Tijuana" (workers waiting to cross the border), and "The role of mass media during elections," to "National Elections and Political Parties." All the topics were presented in Spanish.

The eighth-grade teacher in the public school in San Diego decided not to present the topic of birth control. She felt that the subject was inappropriate for her students, since it was still "too soon to be relevant." Other teachers didn't see any problems with the birth control topic and in fact the students showed no reluctance in writing or translating articles that dealt with the legal and moral aspects of birth control.

Students in each participating school selected from a list of topics the one they preferred to write about. Table 1 shows the number of articles per topic in each participating school.

Topic	Tijuana	Juneau	San Diego
The ideal high school	0	5	7
The most needed social change	4	0	3
The biggest news in town lately	0	3	1
Youth and drugs	20	8	10
Undocumented workers from Mexico	6	2	7
Birth control	4	2	-
The role of media during elections	0	1	2

Table 1: Number of student articles by topic from each of the sites.

The most popular topic in all sites was youth and drugs. The students wrote thoughtful descriptions of the drug problem, and their understanding of the reasons for drug use by some of their peers. The

topic of problems associated with undocumented workers crossing the Mexico/US border was also attractive to students.

Writing for the Computer Chronicles provided a functional learning environment for the development of writing and language skills. The awareness of a real audience for their writing focused students' motivation. They took care in their writing not because it would be evaluated by the teacher but because they want to express themselves clearly.

In addition to gaining a sense of audience, this form of exchange provided the students exposure to very different perspectives on similar topics. This wider audience helped students explain positions that might have otherwise be taken for granted when written for their local peers. And when the students edited articles from other sites there were expressions of disagreement with the ideas expressed.

For example, a girl in Tijuana was bothered by an article from San Diego on the topic "The most needed social change." The American student dealt with pollution in general and the need to close polluting industries. The Mexican student was more concerned about the jobs that would be lost from such a measure. She also questioned the issue being defined as the most needed social change. In her opinion a more needed social reform was to create centers for support and orientation for youth.

It is our view that these differing points of view, so authentically presented by the students, can be (as in fact they were) elaborated during

class or through student editorial boards. The consensus reached in each site is independent from other sites. The raising of issues and the expression of ideas is free in the network; the elaboration, editing and final publication is locally controlled. In this way, we address potential concerns about the control of this emerginly important educational channel.

Joint Inquiry Projects in Natural and Social Science. The organization of scientific projects so that students participate jointly across temporal, spatial and cultural borders has a twofold purpose: it creates functional learning environments for the learning of the content and methods of the natural and social sciences while at the same time providing an opportunity for students to interact on topics which are not tied to their cultural differences.

In the Tijuana-Juneau-San Diego pilot study we asked students to fill out questionnaires about their sport preferences, how they spent their leisure time and how they see themselves ten years from now. We analyzed the results of the surveys locally with the students. Results were tabulated and discussed from the point of view of preconceptions about themselves and others. For example, in the sport survey students were asked to report their first and second sport preference. They were also asked which sport they thought would be selected as first choice in their town and in each of the other participating sites. Comparisons were made between students' actual preferences and what they expected to be the preferred sport for their site. In Tijuana most of the students predicted the data would show that soccer is the favorite sport among their peers. Instead it was volleyball. The students' inaccuracy in predicting the most

preferred sport by their peers suggests that students could learn much about their own culture as well as other cultural groups through this type of activities.

The scope of this project was limited, yet it was sufficient to indicate the vast potential for learning that is possible when students share their views with students with radically different cultural perspectives.

Cross-Cultural Simulation Games. Simulation games (Boocock & Schild, 1968; Inbar & Stoll, 1972) provide the opportunity to pose problems for cross-cultural teams to solve in a cooperative modality, which, in turn, enables us to explore an important question in cognition and instruction: do students working together albeit separated by time and space and across cultures receive cognitive and social benefits from their interactions? Our goal, in the introduction of simulation games into the intercultural network then, is to create crosscultural teams on play cooperatively against other crosscultural teams. This avoids a situation in which cultures are competing against each other.

A simple simulation game was used in the Tijuana-San Diego-Juneau pilot network. Two international bicycle companies were competing against each other. Students in each location were divided into two teams. Each team had to coordinate with their colleagues in the other sites in order to design a joint policy. Results were tabulated jointly for the three sites. The students enjoyed the activity and wanted to continue it for longer periods of time in order to learn each others' strategies.

Playing simulation games across time, cultural and linguistic boundaries requires more than a high level of interaction at the technical level (schedules, intelligibility), it requires understanding of the mentality of other players. The need to coordinate moves among partners in different cultures poses an interesting situation for joint problem solving. Unfortunately most existing simulations games require time and place simultaneity. There is need to develop more games that will be appropriate for long distance, non simultaneous interaction.

Receiving End Translation.

Two languages, English and Spanish, were spoken by the students in the Juneau-San Diego-Tijuana experiment. The messages from each site were generated in the local language and then translated "at the receiving end." We chose to handle translation in this way in order to provide an equal opportunity for students in the various locations to participate in the activities without being impaired by the need to do so in a foreign language.

Having messages translated at the receiving end creates a situation in which bilingualism is a valuable resource, not the liability it is often perceived to be in the educational system (Moll & Diaz, 1985). It also motivates students to learn about foreign languages. In those cases where there were no students who knew Spanish, for example, they either found local resources in their communities or other network sites to help in the translation.

Our experience in the Tijuana-Juneau-San Diego connection especially provided support for the value of organizing translation at the receiving end of the network. The willingness of the Tijuana teachers and students to participate in the network became visibly stronger once then learned that they didn't have to write articles in English.

This also applied for the translation of incoming messages. Students eagerly volunteered to translate articles from English to Spanish and vice versa. The volunteers were not necessarily bilingual or the high achieving students. It was simply accepted by everyone that Mexican students would write in Spanish and the American students would write in English. The need to translate between two languages was perceived as functional by the students and supported their publishing goal. The revision and editing of articles were instrumental for achieving a high quality newspaper. In that way we were able to create a functional learning environment for literacy in both local and foreign languages.

The Continuing Development of the Network

The Intercultural Network is undergoing expansion and elaboration. The network participants include university researchers and students, secondary level teachers and students. Three somewhat parallel courses were established in Tokyo, Jerusalem and San Diego in the Fall of 1984 to deal directly with the educational potential of this network. College level students participate in the design and implementation of the various activities. They also provide the necessary support for the secondary

schools participating from each of these sites as well as from Mexico and Alaska. Other sites (Mexico City, Madrid and Sydney) are being considered for incorporation into the network. New activities in the social and natural science domains are under development.

With the expansion of the network to other sites and to more activities, the inquiry projects have become the framework for numerous initiatives coming from college students in the various sites. One such project has been established to explore occupational changes across generations and across cultures. This project focuses in the occupational patterns in three generations: the students' grandparents, parents and themselves. A separate analysis is made for men and women in each of the cultures involved. Students survey their own families, analyze the data for the whole sample and report their findings.

Other topics of interest have been developed in the Social Sciences including a comparative analysis of the topics covered in the newspaper and the allocation of space and prominence to them, a crosscultural comparison of educational systems, joint exploration of students' knowledge about different cultures, the role of women in society and the portrayal of women in the media.

College students have proposed inquiry projects for the natural sciences, including activities dealing with weather phenomena or with environmental comparisons. A chemistry major proposed usi

schools participating from each of these sites as well as from Mexico and Alaska. Other sites (Mexico City, Madrid and Sydney) are being considered for incorporation into the network. New activities in the social and natural science domains are under development.

With the expansion of the network to other sites and to more activities, the inquiry projects have become the framework for numerous initiatives coming from college students in the various sites. One such project has been established to explore occupational changes across generations and across cultures. This project focuses in the occupational patterns in three generations: the students' grandparents, parents and themselves. A separate analysis is made for men and women in each of the cultures involved. Students survey their own families, analyze the data for the whole sample and report their findings.

Other topics of interest have been developed in the Social Sciences including a comparative analysis of the topics covered in the newspaper and the allocation of space and prominence to them, a crosscultural comparison of educational systems, joint exploration of students' knowledge about different cultures, the role of women in society and the portrayal of women in the media.

College students have proposed inquiry projects for the natural sciences, including activities dealing with weather phenomena or with environmental comparisons. A chemistry major proposed using the network to explore the background conditions influencing chemical reactions: to find specific chemical reactions that would take place under "normal" conditions in one site but not on others. The sites differing in altitude,

humidity, temperature, air composition, etc., provide a real life laboratory for the specific reactions. Other students have proposed projects dealing with dietary differences (source and proportion of proteins or carbohydrates in the regular diet).

One of the university students in Jerusalem proposed a project which explored a variation of the traditional Piagetian "perspective" problem on a world wide scale. It happens that if we follow the "growth" of the moon during a lunar month, (which is the regular Hebrew month), we find that at the beginning of the month the moon begins to shine on the right side of the moon. Thus creating an arc like the right parenthesis ")" . In the middle of the month the moon is full. Then it begins to decrease into a left parenthesis form "(" . Now, all this is correct, but only for the northern hemisphere. If you look at the moon from the southern hemisphere the moon begins to shine on its LEFT side "(" at the beginning of the month and it finishes the month on the right side ")". The reason for this difference is the point of view of the observer: if we would look at both observers on earth from another planet we would see that while the observer in the northern hemisphere is "standing" head north, the one in the southern hemisphere is standing head south. (Imagine a ball o which is the earth. Now imagine a man standing in the northern hemisphere d . Now the same man standing in the southern hemisphere q . If both men are looking at the same object -the moon- what is left for one will be right for the other.)

With the incorporation of Australia into the network we plan to carry out joint scientific explorations among students in both hemispheres (e.g.

to prove that the globe is spheric). Through this activity we expect to develop a functional environment to learn scientific hypothesis testing. The students will have to find out ways to coordinate their observations to jointly experience the phenomena described above, including describing the night sky at their places on the same dates in a way that will be comparable to other sites. The inherent need to coordinate their points of view should provide a powerful environment to explore scientific processes: observation and measurement under predefined and agreed conditions, communication of procedures and results using standardized terminology, data collection and analysis in comparable ways.

The joint creation of new activities requires the highest level of coordination and mutual understanding. When undergraduates from the various sites attempt to create an "international treasure hunt" or coordinate a new curriculum of science activities to be used in all the sites, they will have to be aware of differences in student interest, the level of factual knowledge they can assume and the amount of work they can require in the new activity.

The progressive level of coordination and mutual understanding required in the activities is expected to attenuate the pace of introduction of this new technology into the regular school curriculum. Thus, students and teachers are not overwhelmingly exposed to other cultures in a very committing endeavor. The guiding notion is "no culture shock." The process of mutual cultural exploration is direct and authentic, but it proceeds at the pace chosen by the participants.

Conclusion

We have created functional learning environments with microcomputers and electronic networks in which students learn languages, computers, writing in order to communicate, and communicate in order to learn natural and social sciences, and cultures. The projects in the Intercultural Network are developed to be functional environments for student learning. Taking advantage of the high motivation resulting from participation in world-wide projects such as newspaper writing, social and natural science surveys, students see a purpose for their learning: to share ideas with students with whom they can not interact directly. The translation activities showed students the value and utility of knowledge of a second language.

Natural and social science inquiry projects are organized so that students from different cultures provide each other with information that otherwise could not be easily achieved or would require long (and boring) bibliographic search. In the Intercultural Network students select a topic to work on and task groups are formed across cultures to investigate that topic. Students carry out the research in their communities and exchange data and preliminary reports. A "project coordinator" from the cooperating university guides the task groups remotely via electronic network. Systematic methods for gathering and reporting findings become a real-life necessity for students who are gathering and comparing natural and social science data from different locations. The network also provides the students with first hand impressions on the human side of political, economical and social changes, norms of behavior, traditions and values in different cultures and, by contrast, norms and values in their own

culture.

The network now provides an environment for more systematic research on the effect of mediated contact on students attitudes and knowledge about other cultures, on students learning and motivation on the areas of science and social science dealt with, and on the effect of real target audiences for learning writing and languages.

By adopting a "participant observation" methodology at this early stage in the research, we have been able to discover the ways in which students and teachers can use this new instructional medium for a variety of uses. Now that the InterCultural Network is functioning, we are currently using it as a rich environment in which to conduct a wide range of carefully controlled studies of learning, problem solving, and interaction.

References

Amir, Y., Bizman, A., Ben Ari, R., & Rivner, M. (1980). Contact between Israelis and Arabs: A theoretical evaluation of effects. Journal of Cross-Cultural Psychology, 11, 426-443.

Barnea, M., & Amir, Y. (1981). Attitudes and attitude change following intergroup contact of religious and nonreligious students in Israel. Journal of Social Psychology, 115, 65-71.

Boocock, S., & Schild E. O. (1968). Simulation games in learning. Beverly Hills, CA: Sage Publications.

Brewer, M. B., & Kramer, R. M. (1985). The psychology of intergroup attitudes and behavior. Annual Review of Psychology, 36 219-243.

Cohen, M. S., & Miyake, N. (1985). An intercultural learning network: comming of age in electronic messaging. Paper presented at the Annual Meetings of The American Educational Research Association.

Computer Use Study Group (CUSG). (1983). Computers in schools: Stratifier or equalizer? The Newsletter of the Laboratory of Comparative Human Cognition, 5 (3).

Davey, A. G., & Mullin, P. N. (1982). Inter-ethnic friendship in British primary schools. Education Research, 24, 83-92.

Dewey, J. (1955). Child and the curriculum and the school and society. Chicago: University of Chicago Press.

Dewey, J. (1963). Experience and education. New York: Collier.

Gerard, H. B., & Miller, N. (1975) School desegregation. New York: Plenum.

Hawkins, J., Sheingold, K., Gearhart, M., & Berger, C. (1982). Microcomputers in schools: Impact on the social life of elementary classrooms. Journal of Applied Developmental Psychology, 3, 361-373.

Inbar, M., & Stoll, C. (1972). Simulation and gaming in social science. New York: Free Press.

Johnson, D. W., Johnson, R. T., & Maruyama, T. (1984) Goal interdependence and interpersonal attraction in heterogeneous classrooms: A meta-analysis. In N. Miller, & M. B. Brewer (Eds.), Groups in contact: The psychology of desegregation 187-212. San Diego: Academic.

Jules-Rosette, B., & Mehan, H. (1985). Desegregation: An interactionist approach. In J. Prager (Ed.), School desegregation research. New York: Plenum.

Kagan, S. (1985). Cooperative learning and sociocultural factors in schooling. Sociocultural factors in bilingual education Sacramento: Bilingual Education Office.

Laboratory of Comparative Human Cognition. (1982). A model system for the study of learning difficulties. The Quarterly Newsletter of the Laboratory of Comparative Human Cognition, 4, 39-66.

Levin, J. A., & Cohen, M. S. (1985). The world as an international science laboratory: Electronic networks for science instruction and problem solving. Journal of Computers in Mathematics and Science Teaching (in press).

Levin, J. A., & Riel, M. M. (1985). Educational electronic networks: How they work (and don't work). Paper presented at the Annual Meetings of The

American Educational Research Association.

Levin, J. A., Riel, M. M., Rowe, R. D., & Boruta, M. J. (1985). Muktuk meets jacuzzi: Computer networks and elementary school writers. In S. W. Freedman (Ed.), The acquisition of written languages: Revision and response. Hillsdale, NJ: Ablex.

Martin, L. M. (1983). Children's problem solving as inter-individual outcome. Unpublished PhD dissertation, University of California, San Diego.

Mehan, H., Moll, L., & Riel, M. M. (1985). Computers in classrooms: A quasi-experiment in guided change. (Final report to NIE). La Jolla, CA: Teacher Education Program.

Mehan, H., & Riel, M. M. (1982). Teachers' and students' instructional strategies. ed. L. L. Adler Cross-Cultural Research at Issue. New York: Academic Press.

Miller, N., Rogers, M., & Hennigan, K. (1983). Increasing interracial acceptance: Using cooperative games in desegregated elementary schools. In L. Bickman (Ed.), Journal of Applied Social Psychology Annual, 4, 199-216.

Miyake, N. (in press). Constructive interaction and the iterative process of understanding. Cognitive Science .

Moll, L., & Diaz, S. (1985). Bilingual communication and reading: The importance of Spanish in learning to read English. Elementary School

Journal, in press.

Newman, D. (1984). Functional learning environments (Tech. Rep. No. 25). New York: Bank Street College of Education, Center for Children and Technology.

Piaget, J. (1947). Psychology of intelligence. London: Routledge and Kegan Paul.

Piaget, J., & Inhelder, B. (1948). The child's conception of space. New York: Norton.

Quinn, C. N., Mehan, H., Levin, J. A., & Black, S. D. (1983). Real education in non-real time: The use of electronic message system for education. Instructional Science, 11, 313-327.

Riel, M. M. (1982). Computer problem solving strategies and social skills of language impaired and normal children. Unpublished PhD dissertation, University of California, Irvine.

Riel, M. M. (1985). The Computer Chronicles Newswire: A functional Learning environment for acquiring literacy skills. Journal of Educational Computing Research, 1 (3), 317-337.

Scott, R. R., & McPartland, J. M. (1982). Desegregation as a national policy: Correlates of racial attitudes. American Educational Research Journal, 19, 397-414.

Sharan, S. (1980). Cooperative learning in small groups: Recent methods and effects on achievement, attitudes and ethnic relations. Review of Educational Research, 50, 241-271.

Slavin, R. (1980). Cooperative learning. Review of Educational Research, 50, 315-342.

Spradley, J. P., & McCurdy, D. W. (1972). The cultural experience: Ethnography in complex society. Chicago: Science Research Associates.

Steinberg, Z. D., & Cazden, C. D. (1979). Children as teachers of peers and of ourselves. Theory into Practice, 17, 258-266.

Stephan, W. G., & Rosenfield, D. (1978). Effects of desegregation on racial attitudes. Journal of Personality and Social Psychology, 36, 795-804.

Vygotsky, L. S. (1978). Mind in society: The development of higher psychological processes. M. Cole, V. John-Steiner, S. Scribner, & E. Souberman (Eds.), Cambridge: Harvard University Press.

Webb, N. (1982). Student interaction and learning. Review of Educational Research, 52, 421-445.